

**RESPONSES TO U.S. EPA AND OEPA COMMENTS ON
THE PROJECT SPECIFIC PLAN (PSP) FOR THE
RE-INJECTION DEMONSTRATION TEST PLAN
FOR AUGUST 1997**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO**

DECEMBER 1997

**U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE**

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**RESPONSES TO U.S. EPA COMMENTS ON THE PROJECT SPECIFIC PLAN FOR THE
RE-INJECTION TEST PLAN
FOR AUGUST 1997**

1. Commenting Organization: U.S. EPA Commentor: Saric
Section#: 4.4 Pg. #: 49 Line#: 1 Code:
Original Comment# 1
Comment: The text states that Geoprobe™ sampling will be conducted prior to the start of re-injection and then 4, 8, and 12 months of re-injection. Other sampling activities, such as biological groundwater quality, and borescope measurements, will be conducted quarterly. All sampling should be conducted on the same quarterly schedule so that all the data produced are comparable.
Response: The sampling frequency for the Geoprobe™ sampling will be changed so that sampling will be conducted prior to the start of re-injection and then at 3, 6, 9, and 12 months after the initiation of re-injection.
Action: Line 1 on page 49 will be revised to read as follows: "Geoprobe™ sampling will then take place after 3, 6, 9, and 12 months of re-injection." The schedule in Table 6-1 for Geoprobe™ sampling will also be changed.

2. Commenting Organization: U.S. EPA Commentor: Saric
Section#: 4.4 Pg. #: 56 Line#: NA Code:
Original Comment# 2
Comment: The plan states on Page 36 that a deep monitoring well will be installed at four of the five re-injection well locations. However, Figure 4-1 does not show a deep monitoring well next to re-injection well 22107. Figure 4-1 should be revised to reflect the information on Page 36 of the plan.
Response: The well symbol was inadvertently left off of the figure and the figure needs to be corrected.
Action: A deep monitoring well symbol will be added to Figure 4-1 next to Re-injection Well 22107.

3. Commenting Organization: U.S. EPA Commentor: Saric
Section#: 6.0 Pg. #: 64 Line#: NA Code:
Original Comment# 3
Comment: This section describes the schedule of activities to be completed in general terms. The plan should present the specific date of project initiation and the specific dates for each major activity and reporting milestone.
Response: As stated on page 64 of the test plan, enforceable schedules for the aquifer remedy can be found in the Remedial Action Work Plan for the Aquifer Restoration at Operable Unit 5. As construction of the system is completed, a specific date for project initiation, that is consistent with (or ahead of) the enforceable RA Work Plan schedule, will be announced. Once re-injection begins it will be possible to define specific dates for each major activity in the test plan. Until the initiation date has been announced the activity schedule will remain in general terms.
Action: The requested specific dates will be provided through the IEMP quarterly reports once the dates have been established.

**RESPONSES TO OEPA COMMENTS ON THE PROJECT SPECIFIC PLAN FOR THE
RE-INJECTION TEST PLAN
FOR AUGUST 1997**

4. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 1.0 Introduction Pg.#: 1 Line#: 26-29 Code: C
Original Comment# 1
Comment: The authors overstate maintaining high water levels due to re-injection. The text makes the statement that re-injection will minimize draw downs and keep water levels high. Based on Figure 1-4, overall groundwater levels will decline on the order of 4-6 feet, whereas, injection will locally raise groundwater levels (mounding) on the order of 2 feet. While it is true this will reduce-residual contamination, the text neglects the fact that there will be an overall decline in water levels from prepumping to the post 1998 condition.
Response: The concept that the text in question was trying to present was that re-injection will help minimize excessive drawdown of water levels. The text will be revised as indicated below to reflect the concern expressed in the comment that the text overstates maintaining high water levels due to re-injection.
Action: Lines 26 to 29 on page 1 will be revised to read as follows: "Re-Injection will help minimize excessive drawdown of water levels in the target cleanup zones by maintaining higher water levels in the areas where re-injection is occurring. This will help reduce the amount of residual contamination left in the unsaturated portion of the aquifer."
5. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 1.0 Introduction Pg.#: 1 Line # 18-21 Code: C
Original Comment# 2
Comment: The stated benefit of re-injection of minimizing pumping related drawdown at neighboring properties beyond the FEMP property is not addressed or mentioned again within the text of the plan. Further discussion within the plan should be provided and at a minimum include a description of the methods of monitoring, monitoring frequency, and reporting required to demonstrate that these pumping impacts have been minimized.
Response: DOE agrees that additional text is needed in the plan to communicate how this question is being addressed. Groundwater modeling results presented in the Baseline Remedial Strategy Report indicate that re-injection helps to minimize pumping related drawdown by reducing the net amount of groundwater that is pumped from the aquifer. Water level measurements made during the re-injection demonstration will be compared to model predicted elevations to determine if the pumping induced water table impacts predicted by the groundwater model are consistent with measured impacts.
Action: Lines 23 and 24 on page 2 will be revised to read as follows: "Determine if hydraulic patterns and profiles that indicate increased flushing in the aquifer, and minimized pumping related drawdown are being achieved as predicted by the groundwater model."
- Line 12 on page 61 will be revised to read as follows: "Actual data will be compared to modeled predictions to asses whether or not model predictions (i.e., pumping related drawdown in the aquifer both on and off-property) are being realized."

6. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 1.0 Introduction Pg.#: 1 Line#: 18-30 Code: C
Original Comment# 3
Comment: The benefits listed for using re-injection neglects to include the accelerated cleanup concept contained in the BRSR (June, 1997) which describes strategies to improve the OU5 FS 20 to 30-year groundwater cleanup period to the new Ten Year Plan. The Ten Year Plan relies on the use of re-injection wells.
Response: The text does not neglect the accelerated cleanup concept but refers to it as "enhanced aquifer restoration". The sentence will be revised to provide clarification.
Action: Lines 15 through 17 on page 1 will be revised to read as follows: "Groundwater re-injection was determined to be a potentially viable strategy for shortening the duration required to achieve aquifer restoration. This strategy was presented in the Baseline Remedial Strategy Report Remedial Design for Aquifer Restoration (DOE 1997a). In addition to shortening the remediation time frame, the following benefits are anticipated:
- Re-injection will increase the rate of aquifer flushing in the more highly contaminated areas thereby reducing the time required to achieve clean-up."
7. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 1.3 Decision Criteria Pg.#: 5 Line#: 25-28 Code: C
Original Comment# 4
Comment: The text discusses injection and pumping rate adjustments that will be made to maintain the 20 µg/L total uranium plume capture; however, there is no description of the procedures and criteria for injection rate adjustment. Because these adjustments may be necessary for a viable system, they should be described in the plan.
Response: The Operations and Maintenance Master Plan (OMMP) for the Aquifer Restoration and Wastewater Treatment Project presents operational philosophy for the aquifer remediation system. If it is determined that pumping and re-injection rate adjustments need to be made, then groundwater modeling will be conducted to help determine what the new pumping and re-injection rates will be. Before any pumping or re-injection adjustments are implemented in the field though, an assessment as to how the adjustments will effect the routing of pumped groundwater at the new rates, either to treatment or bypass, will be made following the strategy presented in Figure 5-6 of the OMMP. If after the adjustments are made, monitoring data indicate that capture is still not being achieved then the procedure will need to be repeated until it is determined that capture is maintained.
Action: The following sentence will be added to line 28 on page 5: "Operational philosophy for the aquifer remediation system is presented in the Operations and Maintenance Master Plan for the Aquifer Restoration and Wastewater Treatment Project (DOE 1997)."
8. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 1.4 Start-Up Sequence for the Demonstration Pg.#: 8 Line#: 2 Code: C
Original Comment# 5
Comment: The text should describe specifically how flow rates and water levels are to be monitored.
Response: Clarification, as suggested, would improve the plan.
Action: Line 32 on page 7 and lines 1 and 2 on page 8 will be revised to read as follows: "Water levels and flow rates in the re-injection wells will be closely monitored for stability, using pressure transducers and flow meters, for approximately two hours following startup before a decision will be made to move to the next re-injection well to begin operation there."

9. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.0 Introduction Pg.#: 12 Figure 1-2 Line #: Code: C
 Original Comment# 6
 Comment: The re-injection technology evaluation flowchart seems to infer that adjustments to the injection flow rate will require that injection be stopped prior to continuing the remediation. This may not be necessary in all circumstances.
 Response: Agree, text in the figure will be revised.
 Action: The box which states "Restart the re-injection demonstration" in Figure 1-2 will be revised to read "Proceed with re-injection demonstration." The word "stop" will be removed from the following two boxes; "Stop; Use re-injection technology as outlined in the Baseline Remedial Strategy Report" and "Stop: Modify the remedy and use re-injection technology".
10. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.0 Introduction Pg.#: 12 Figure 1-2 Line#: Code: M
 Original Comment# 7
 Comment: Future groundwater modeling should be incorporated as a means of cross-checking the re-injection viability determined from the field results and for updating the conceptual model of the site. While discussion of groundwater modeling for planning purposes (i.e., BRSR) is presented, the plan should provide further discussion on how groundwater modeling will be used as an assessment tool.
 Response: A discussion on how groundwater modeling will be used as an assessment tool is presented in Section 3.7.1 of the IEMP.
 Action: No revision to the Test Plan required.
11. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.0 Design Considerations Pg.#: 28 Figure 2-3 Line#: Code: C
 Original Comment# 8
 Comment: The water elevation map for August 1996 demonstrates the hydraulic capture. Additionally, it would be helpful to provide a display of the drawdown. This would provide an areal display of where the GMA aquifer levels would decline and could also be used to compare with the model predictions (Figure 5-7, Baseline Remedial Strategy Report). Rather than select simply two monitoring periods, it is suggested that time-averaged water elevation data be used. Perhaps averaging values from 1994-1996 and subtracting this from water elevation data in the prepumping 1990-1993 period would provide a meaningful display of overall drawdown.
 Response: A discussion of drawdown due to the south plume pumping is not the focus of the test plan. DOE agrees that the type of evaluation suggested would provide a meaningful display of overall drawdown though and may utilize the method when the South Field, South Plume Optimization, and Re-Injection Demonstration Modules are operational.
 Action: No revision to the Test Plan required.
12. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.2 Aquifer Characteristics Pg.#: 17 Line#: 18 Code: C
 Original Comment# 9
 Comment: The text should describe what comprises the remaining 24 feet of overburden at 4398.
 Response: The description will be added as requested.
 Action: Lines 15 to 18 on page 17 will be revised to read as follows: "The Great Miami Aquifer is unconfined, anisotropic, and heterogeneous and has been federally designated a sole-source aquifer by the U.S. EPA. As recorded during the drilling of Monitoring Well 4398, the lithology in the area of the Re-Injection Demonstration, in descending order,

consists of approximately 24 feet of silty clay and approximately 167 feet of sand and gravel. Bedrock is approximately 191 feet below ground surface (bgs)."

13. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 2.2 Aquifer Characteristics Pg.#: 17 Line#: 18 Code: M
Original Comment# 10
Comment: The text states that groundwater flow is now more to the south due to pumping from the South Plume Module, however, a closer look at water levels in Figures 2-2 and 2-3 indicates that groundwater levels were contoured using different methods which may have mislead the author. The sharp bends in groundwater levels (e.g., the 518 ft level northeast of 2128) in Figure 2-2 suggest that water levels were developed using a computer-based contouring algorithm such as TIN. Figure 2-3, however, appears to be hand contoured. Groundwater contours in the south eastern portion of Figure 2-2 are likely computer generated extrapolations. It is this extrapolation when compared to the hand-drawn contours that gives the appearance of groundwater flow direction change. A number of figures in the March 1995 OU5 RI also appear to have been developed using computer generated contouring, e.g. Figures 3-50 and Figure 3-51. Development of a consistent and hydro geologically correct methodology for constructing groundwater-level contour maps is critical to appropriately assessing the performance of the groundwater remediation. When comparing groundwater levels, a consistent groundwater-contouring interval should be applied, groundwater-contouring lines should be hydro geologically viable, and groundwater-contour maps should show the location of major influencing factors such as the location of bedrock.
Response: Agree, future groundwater elevation maps will be prepared as suggested. Figure 2-2 will be removed from the Test Plan. The figure numbers on Figures 2-3, 2-4, and 2-5 will be adjusted accordingly to provide for the deleted figure. Text in Section 2 will be revised to reference the one figure only.
Action: Prepare future groundwater level maps as suggested. Well numbers and bedrock highs will be added to the maps, and a consistent contour interval will be used. Lines 20 to 23 on page 17 will be revised to read as follows: "As explained in Section 2.3, four extraction wells have been pumping south of the re-injection demonstration area since August of 1993. Figure 2-2 is a water table map from 1996 that illustrates groundwater levels in the re-injection demonstration area with the four existing extraction wells pumping."
14. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 2.0 Design Considerations Pg.#: 27-28 Figure 2-2 and 2-3 Code: C
Original Comment# 11
Comment: The figures should include a reference line showing the extent of groundwater monitoring per the DMEPP. Also a number of wells, e.g. 2391 appears on Figure 2-2, but not 2-3. To provide the best comparison of water levels, equivalent wells should be presented unless 2391 had not yet been installed in 1993.
Response: This comment is similar to Comment #13.
Action: See action to Comment #13.
15. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 2.2 Aquifer Characteristics Pg.#: 18 Line#: 28-30 Code: C
Original Comment# 12
Comment: There seems to be a logic flaw in the application of the designations for chemical mobility and persistence. Table 2-1 includes the designation of "MP and "N" as developed in the OU5 FS. As stated in lines 30-32, page 18, these terms were based on constituent migration through the glacial overburden. These classifications seem to be

inappropriately used in the re-injection plan. Although the complete monitoring strategy is not clearly discussed in this plan, the layout of the table implies that many of the constituents are not mobile "N" in discussing migration through the Great Miami Aquifer. The primary reason for constituents being designated as not mobile is the high sorptive capacity of the glacial overburden. The Great Miami Aquifer does not offer such high levels of sorptivity.

Response: The same logic for monitoring outlined in the Integrated Environmental Monitoring Plan is carried forward for the Re-Injection Demonstration Test Plan. As explained on page 18 of the Re-Injection Test Plan, the terms mobile and persistent are used to describe those constituents that are predicted to be able to migrate vertically through the glacial overburden reach the aquifer, and create unacceptable risk in the absence of source control actions. In determining the unacceptable risk to the aquifer the point of determination was at the entry point into the aquifer. This approach is the most conservative because it does not rely on transport in the aquifer. Additional details on parameter selection can be found in Appendix A of the IEMP.

Action: No revision to the Test Plan required.

16. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 2 Aquifer Characteristics Pg.#: 25 Table 2-1 Line#: Code: C

Original Comment# 13

Comment: The table does not include several radionuclides (Neptunium-237 and Radium-226) with groundwater concentrations > FRL in zones 2 and/or 4 (as per Table A-21, IEMP). Why?

Response: Neptunium-237 and Radium-226 were inadvertently left off of Table 2-1. The table will be revised.

Action: Revise Table 2-1, add Neptunium-237 and Radium-226.

17. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 2.3 Aquifer Remedy Pg.#: 19 Line#: 20 Code: C

Original Comment# 14

Comment: Either the text should be changed by replacing "phases" with "modules" or Figure 1-3 should be modified to illustrate remediation implementation changes with time.

Response: The change suggested by the commentor is not appropriate, but an attempt will be made to clarify the text.

Action: Line 19 and 20 on page 19 will be revised to read as follows: "The remedy consists of 37 pumping wells and 10 re-injection wells (Figure 2-5) which will be installed as phased modules as described below. Figure 1-3 shows the locations of the modules."

18. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 2.4 Industry Knowledge on the Design of Re-Injection Wells Pg.#: 22

Line#: 14-15 Code: C

Original Comment# 15

Comment: It is not clear how the industry knowledge on the design of re-injection wells that "an effort should be made to maximize the length of the well screen," was used in selection of the actual re-injection well screen lengths.

Response: An effort was made to maximize the screen length, but the location and thickness of the total uranium plume was also considered.

Action: The last bullet on page 33 will be revised to read as follows: "Maximize the length of the screen within the constraints imposed by the location and thickness of the 20 µg/L total uranium plume."

19. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 2.5 Previous Site Experience Pg.#: 23 Line#: 26 Code: C
Original Comment# 16
Comment: The statement is made that total iron concentration above 5ppm results in precipitation of ferric iron in the Great Miami Aquifer. This seems to contradict the statement made on page 31 lines 12 and 13 that suggest a limit of 0.1 ppm total iron necessary to prevent the buildup of iron precipitate and bacteria in the wells. Please clarify these differences.
Response: Agree, the number should be 0.15 ppm not 5 ppm. Appendix F of the Phase II South Field Injection Test Report for Operable Unit 5 provides a geochemical analysis of waters injected into the GMA which was done in support of an earlier single well injection test. The 0.15 ppm iron concentration is derived from Figure F-5. The sentence will also be revised as indicated below to provide clarification.
Action: In line 25 and 26 on page 23 will be revised to read as follows: "Geochemical modeling using geochemical data collected from Well 31567 (a well used in earlier injection tests), which is located in the Southfield, indicated that a total iron concentration in the aquifer above 0.15 ppm may result in precipitation of ferric iron. Sampling results presented in Table A-1 indicate that the iron concentration in the re-injection demonstration area, in the shallow zone being targeted for re-injection (2000 series results) is below this concentration."
20. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Demonstration Setup Pg.#: 31 Line#: 18 Code: C
Original Comment# 17
Comment: The plan should further describe operationally when the flow rate will be controlled locally at each well head and when the flow rate will be controlled remotely from the AWWT Control Room.
Response: The flow rate will be both monitored and controlled by the Distributed Control System (DCS) which will be located in the AWWT Control Room. The DCS will be monitored 24 hours a day. It will also be possible to monitor and control the flow rate locally, if desired. Any changes made locally would be detected by the DCS monitor.
Action: Line 17 on page 31 will be revised to read as follows: "The injection flow rate will be controlled remotely from the AWWT Control Room. It will be possible to control the flow rate locally at each well head, but and change made locally will be detected in the AWWT Control Room."
21. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.1 General Design of the Re-Injection Wells Pg.#: 33 Line#: 26 Code: C
Original Comment# 18
Comment: Restriction re-injection wells in areas where total iron concentration is below 5 ppm seems to contradict the statement made on page 31 lines 12 and 13 that suggest a limit of 0.1 ppm total iron necessary to prevent the buildup of iron precipitate and bacteria in the wells. Please clarify these differences.
Response: The 5 ppm figure should be 0.15.
Action: Line 26, on page 33, will be revised by changing "5 ppm" to "0.15 ppm".
22. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.1 General Design of the Re-Injection Wells Pg.#: 33 Line#: 33 Code: C
Original Comment# 19
Comment: The source of the total uranium plume thickness and depth information used to size the re-injection well screens should be cited.
Response: A discussion and citation are given in lines 7 to 14 on page 35 of the Test Plan.
Action: No revision to the Test Plan required.

23. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 3.2 Installation of the Re-Injection Wells Pg.#: 34 Line#: 12 Code: C
 Original Comment# 20
 Comment: The text "completed naturally" should be replaced by "with a natural filter pack."
 Response: Agree.
 Action: Line 12 on page 34 will be revised; "completed naturally " will be replaced by "completed with a natural filter pack".
24. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 3.3 Screen Location and Relations to the 20ug/L Total Uranium Plume
 Pg.#: 36 Line#: 1-7 Code: C
 Original Comment# 21
 Comment: The groundwater modeling results should not be the sole justification for assigning the depth of wells screens. As previously commented on in the Baseline Remedial Strategy Report, the model only approximates the actual heterogenous nature of the sand, gravels and clay which comprise the Great Miami Aquifer. Using particle tracking in such an averaged model can never fully account for the local variations which will govern plume movement. This is especially true for regions of re-injections. With planned the groundwater model revisions underway, it is not prudent to make such statement regarding model predictions.
 Response: DOE believes that based on the tools and information available, that the depths selected for the well screens in the deep observation wells are appropriate. The limitations of the current groundwater model, mentioned by the commentor, are also recognized by the DOE. The fact remains though, that at this point in time, the current groundwater model is the only tool available for predicting what will happen to the aquifer and the total uranium plume as a result of pumping and re-injection. The purpose of the deep monitoring wells is to collect field data to determine if the total uranium plume is moving deeper than that predicted by the model.
 Action: No revision to the Test Plan required.
25. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 3-4 Re-Injection Observation Wells Pg.#: 37 Line#: 3-4 Code: C
 Original Comment# 22
 Comment: The text indicates that Well 22111 is located outside of the plume and that there is no need for deep monitoring at that location; however, Figure 4-1 shows Well 22111 within 20 ug/L plume boundary. Please clarify.
 Response: Well 22111 is plotted incorrectly on Figure 4-1. When plotted correctly Well 22111 is located outside of the plume.
 Action: Revise Figure 4-1, 3-1, and A-1 by plotting Well 22111 at the correct location.
26. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 3.0 Demonstration Setup Pg.#: 39-41 Figures 3-2 to 3-4 Line#: Code: C
 Original Comment# 23
 Comment: All cross-sections presented should include the top of the bedrock surface and the depths of the proposed re-injection monitoring wells.
 Response: It is felt that the cross-sections would be too cluttered if all of this information was put on each section. The depths of the deep monitoring well screens are illustrated in Figure 3-3. The depth of the shallow monitoring wells can be determined by reading the text on page 36 that states that the top of each shallow monitoring well screen will be set at the same depth as the top of the screen in the closest re-injection well. The depths of the screens in the re-injection wells are illustrated in Figure 3-2.

Action: The approximate elevation of the top of bedrock will be added as a note on Figures 3-2 to 3-4.

27. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.0 Testing Program Pg.#: 42 Line#: 28-32 Code: C
Original Comment# 24
Comment: The text describes integration of the collection of water levels collected in this plan with IEMP Water Level Monitoring Program. Please compare this statement with statements in Section 1.6 Relationship to Other Documents, Page 9, Lines 25-29 and clarify.
Response: Water level measurements will be collected monthly in a select group of wells to support the re-injection demonstration. Water levels are currently collected quarterly in a larger group of monitoring wells. On those months when both IEMP quarterly sampling and re-injection demonstration monthly sampling are being conducted, water levels will not be measured twice. They will be measured once and the data used to satisfy both needs.
Action: No revision to the Test Plan required.
28. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.2 Downhole Camera Surveys Pg.#: 44 Line#: 8 Code: C
Original Comment# 25
Comment: What provisions will be made in case the well is too turbid to use a downhole camera? How long would re-injection be delayed to wait for borehole clarity?
Response: The camera survey information will be used along with water level and biological sampling data to help assess the onset or progression of plugging within the re-injection wells. If after 24 hours the water in the re-injection well is too turbid to conduct a survey, plugging will be assessed using the water level and biological data. Turbidity though is not expected to be a problem. The injectate is clean water and the clean water is being pushed out from the well, unlike an extraction well that is pulling groundwater to the well.
Action: No revision to the Test Plan required.
29. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.3 Biological Sampling Pg.#: 45 Line#: 27 Code: C
Original Comment# 26
Comment: The plan should outline the procedures for how the biological samples are to be taken, e.g., number of well volumes removed, etc. The plan should also specify if the biological sampling will be performed before, during, or after the groundwater quality sampling.
Response: The level of detail requested in the comment is better suited for a procedure, not the Test Plan. A procedure is being prepared and will be followed during the sampling activity, similar to the procedures listed on page 47 of the Test Plan for the other monitoring activities. If biological sampling and groundwater quality sampling happen to coincide at a particular location, the biological sample will be collected first.
Action: The following sentence will be added to line 32 on page 45: "If biological sampling and groundwater quality sampling, (discussed in the next section) coincide at a particular location, the biological sample will be collected first."
30. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.4 Groundwater Quality Sampling Pg.#: 46 Line#: 31 Code: C
Original Comment# 27
Comment: To establish pre-injection conditions, the newly installed re-injection wells should also be sampled and analyzed prior to re-injection.

Response: The observation wells which are being sampled are within 25 feet of the re-injection wells. They will serve to establish pre-injection conditions near the re-injection wells.
 Action: No revision to the Test Plan required.

31. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 4.4 Groundwater Quality Sampling Pg.#: 48 Line#:10 Code: C

Original Comment# 28

Comment: It is very important to establish aquifer geochemistry at the FEMP site and in particular in the vicinity of the re-injection wells. It is not clear that the Geoprobe™ sampling tool will so greatly affect sample quality that all anions and cations should be dropped from the subsequent Geoprobe™ groundwater analyses. Field equipment blanks could be used to determine if iron from the Geoprobe™ tool are biasing results. Geoprobe™ samples should continue to include major anions and cations if at all possible.

Response: Agree, all efforts will be made to have Geoprobe™ samples continue to include analysis for major anions and cations, if the data appear to be valid.

Action: No revision to the Test Plan required.

32. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 4.4 Groundwater Quality Sampling Pg.#: 48 Line#:20 Code: C

Original Comment# 29

Comment: The plan should specify how deep the Geoprobe™ samples will be taken.

Response: Agree, text will be revised as described below.

Action: The following sentence will be added to line 8 on page 48: "A groundwater sample will be collected at the water table and at ten foot intervals beneath the water table until it can be verified that the entire vertical thickness of the 20 µg/L total uranium plume has been sampled."

33. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 4.4 Groundwater Quality Sampling Pg.#: 48 Line#:22 Code: C

Original Comment# 30

Comment: For clarity with the previous paragraph, "during the re-injection demonstration," should be moved to the front of the sentence. The paragraph should also describe if the Geoprobe™ locations will be re-occupied during subsequent events.

Response: Geoprobe™ locations will not be re-occupied. The holes are grouted shut upon removal of the tool. New geoprobing will take place within a few feet of the previous location. The clarity suggestion will be made as requested.

Action: Line 22 on page 48 will be revised to read as follows: "During the re-injection demonstration, Geoprobe™ sampling will take place at three locations."

34. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.

Section#: 4.4 Groundwater Quality Sampling Pg.#: 48 Line#:22 Code: C

Original Comment# 31

Comment: The plan should describe if the Hydrolab™ downhole water quality probes will be used to detect variations with depth or be held at one elevation within the wells.

Response: The wells being monitored only have five foot screens. The probes will be lowered to the midpoint of the screens and monitor the one elevation. Depth variations will be observed by monitoring both shallow and deep wells.

Action: Add the following sentence to line 5 on page 50: "Monitoring results from both the deep and shallow observation wells will be used to assess depth variations."

35. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.5 Water Level Monitoring Pg.#: 50 Line#: 26 Code: C
Original Comment# 32
Comment: The plan identifies that ultimately one reading will eventually be taken every 1000 minutes. This frequency does not allow site workers to respond to a catastrophic buildup of water levels in the wells. Back pressure should also be discussed and monitored. Will the slow increase in measurement period lengths follow each scheduled and unscheduled injection well shutdown?
Response: The plan will be changed and the 1000 minute monitoring frequency will be dropped. The response to a rise in water level within a re-injection well will be automatic and not dependent upon an operator. Each re-injection well is being equipped with a water level sensor and recorder for the continuous measurement of water levels. The water level sensor will automatically shut off flow to the well should the water level within the re-injection well rise to within five feet of the top of the well. The water level sensor will operate continuously, and it will be possible to monitor the sensor from the AWWT control room. Should flow be stopped due to the water level in the well rising too high an alarm will be sounded in the AWWT Control Room.

"Catastrophic buildup" is not considered to be a good description of unacceptable water level rise within a re-injection well. The injection water is clean, treated groundwater. While an overflow could make a muddy mess, it would not be "catastrophic".

Back pressures are being monitored within the re-injection wells but not for the purpose of monitoring the rise in water level within the well. Back pressure data will be used to document that the injectate is not being allowed to cascaded down the well.
Action: Line 24 through 30 will be revised to read as follows: "The transducers will be connected to water level sensors and recorders. The sensors will automatically shut off flow to the well should the water level within the re-injection well rise to a specific level. The water level sensor will operate continuously and it will be possible to monitor the sensor from the AWWT control room."
36. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.6 Water Level Monitoring Pg.#: 51 Line#: 25 Code: C
Original Comment# 33
Comment: Does the colloidal borescope provide three-dimensional groundwater flow directions?
Response: No, the colloidal borescope detects flow directions across a horizontal plane.
Action: No revision to the Test Plan required.
37. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.6 Water Level Monitoring Pg.#: 52 Line#: 1 Code: C
Original Comment# 34
Comment: The plan should clarify how the aquifer is stabilized, i.e., groundwater levels, etc.
Response: Agree, clarifying text will be added to the Test Plan.
Action: Line 1 on page 52 will be revised to read as follows: "After re-injection has begun and water levels have equilibrated to the new influx of water, colloid flow directions will be measured in the same four deep re-injection observation wells."
38. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.6 Water Level Monitoring Pg.#: 52 Line#: 6 Code: C
Original Comment# 35

Comment: The plan should specify when the colloidal borescope measurements will be taken with respect to re-injection shutdown. Because many events will be completed on a quarterly basis a description of the relative schedule of each of these events should be provided.

Response: Since the purpose of taking colloidal borescope measurements is to assess flow directions, the timing of the measurements with respect to re-injection and pumping operations is important. Colloidal borescope measurements will be qualified with the operating conditions that were taking place during the collection of the measurements.

For the purpose of developing a routine schedule, sampling events can be divided into two groups: 1) within the re-injection wells and 2) in monitoring wells or at Geoprobe™ locations. Monitoring within the re-injection wells will only be conducted while re-injection is not taking place. The biological sample will be collected first, followed by the downhole camera survey.

It doesn't really matter if re-injection is taking place when the Geoprobe™ samples are collected. The collection of Geoprobe™ samples at each location takes approximately two days. A quarterly schedule for the collection of Geoprobe™ samples will be prepared once the actual system start-up date has been decided.

The collection of water quality, water level and borescope data will be conducted while re-injection is taking place. The activities will take place at several different wells. If one well is scheduled for all three measurements, then the preferred sequence will be to collect the water level first, borescope data second, followed by water quality data last. A specific schedule that incorporates these preferred sampling sequences will be prepared once the start-up date for the re-injection system has been decided. Comment #3 deals with the production of a specific schedule.

Action: The following sentence will be added to line 6 on page 52, " Colloidal borescope measurements will be qualified with the operating conditions that were taking place during the collection of the measurements."

39. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 4.6 Water Level Monitoring Pg.#: 52 Line#: 34 Code: M
 Original Comment# 36

Comment: The plan should provide a description of flow rate monitoring and reporting. The description should also provide how adjustments to flow rate will be achieved and recorded.

Response: Flow rate monitoring will be conducted remotely via the Distributed Control System (DCS) located in the AWWT Control Room. In response to Comment #20, a sentence was added to page 31 that explains how flow rates will be monitored. As discussed on page 64 of the Test Plan, monthly operating reports will include the volume and rate of injection.

Action: No revision to the Test Plan required.

40. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 4.0 Testing Program Pg.#: 56 Figure 4-1 Code: C
 Original Comment# 37

Comment: The figure does not show the location of the deep observation well adjacent to Well 22107. The figure also shows Well 22111 inside of the 20 ug/L plume which contradicts a number of statements within the plan text. Please correct and clarify.

Response: This comment is similar to Comments 2 and 25.

Action: As noted for Comments 2 and 25.

41. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 5.0 Data Evaluation Pg. #: 60 Line#: 13 Code: C
Original Comment# 38
Comment: A bullet should be added which states, "Does re-injection cause the uranium plume to go deeper in the Great Miami Aquifer?"
Response: A bullet will be added as suggested to emphasize this possibility.
Action: The following bullet will be added to line 13 on page 60: "Does re-injection cause the uranium plume to go deeper in the Great Miami Aquifer?"

The following paragraph will be added to page 62: "Does re-injection cause the uranium plume to go deeper in the Great Miami Aquifer? Water quality sampling results from the deep observation wells as well as vertical profile samples will be used to assess whether or not re-injection is causing the uranium plume to migrate deeper in the Great Miami Aquifer. As was discussed in Section 1.3, the concern, should this occur, is whether or not capture of the entire plume can still be maintained."

42. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 5.0 Data Evaluation Pg. #: 61 Line#: 11-13 Code: C
Original Comment# 39
Comment: The discussion regarding comparison of measured data and model results deserves substantially greater discussion. How will this be done? What types of data will be compared? What about resolutions of differences? Is this considered in the Baseline Remedial Strategy Report?
Response: A substantial discussion regarding the comparison of measured water level data and modeling results is presented in Section 3.7.1 of the IEMP. The IEMP provides for the collection of water level data on a quarterly frequency. The FEMP groundwater model is a steady state model. It predicts static water level elevations for each pumping and re-injection configuration. Water levels in the aquifer though are not static, they rise and fall. This variation results from seasonal recharge/discharge patterns and longer term water level trends which have been previously recorded in the aquifer. As explained in the IEMP, model predictions will be compared against this expected range of water levels rather than one set of observed elevations to determine if the model is accurately predicting aquifer response to pumping and re-injection as the remedy progresses.

As part of the re-injection demonstration water levels will be collected monthly rather than quarterly from a select number of wells in the re-injection demonstration area. The monthly data will not be used to verify the continuing fidelity of the model for predicting long term aquifer behavior. Instead, the monthly measurements will be used to assess on a monthly basis how the aquifer is responding to re-injection. Monthly data will also facilitate the determination of the aquifer sensitivity to changes in system operation which may occur during the demonstration.

- Action: The following sentence will be added to line 13 on page 61: "The strategy which will be used for verifying groundwater model predictions of remedy performance is presented in Section 3.7.1 of the IEMP."

43. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 5.0 Data Evaluation Pg. #: 60 Line#: 18 Code: C
Original Comment# 40
Comment: The plan should identify what criteria are specified for determining if there are accedences. The quality of the injectate is also monitored to determine if the water quality being injected could contribute to well plugging.

Response: Agree, the text will be revised to indicate what criteria are specified for determining if there are exceedances.
 Action: Line 18 on page 60 will be revised to read as follows: "Sampling data will be tabulated and compared against FRL values to identify if any FRL exceedances occur."

44. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 5.0 Data Evaluation Pg.#: 60 Line#: 22 Code: C
 Original Comment# 41
 Comment: The text "camera survey" should be replaced by "downhole camera survey."
 Response: Agree, the text will be revised accordingly.
 Action: "Camera survey" will be replaced by "downhole camera survey" in line 22 on page 60.

45. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 5.0 Data Evaluation Pg.#: 61 Line#: 28 Code: C
 Original Comment# 42
 Comment: Groundwater level data should be used in addition to the described methods to determine if a hydraulic barrier has been created at the southern boundary of the FEMP.
 Response: Agree, the text will be revised to include water level data.
 Action: Line 28 on page 61 will be revised by adding "water level data" to the sentence. The following sentence will be added to line 32 on page 61: "Water level data will be used to prepare water level maps to interpret capture zones and groundwater flow divides."

46. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 5.0 Data Evaluation Pg.#: 63 Figure 5-1 Code: C
 Original Comment# 43
 Comment: In the center of the figure, a decision to stop re-injection due to plugging should specify "at a specific well or wells". There may be certain aspects, e.g. well diameter, that may suggest that plugging was unique to that particular well.
 Response: Agree, specification will be added to the sentence.
 Action: The text in question in Figure 5-1 will be revised to read "...a decision to stop re-injection may be made at a specific well or select number of wells."

47. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 6.0 Schedules, Deliverables, and Reporting Pg.#: 66 Table 6-1 Line#: Code: C
 Original Comment# 44
 Comment: The commitment for groundwater quality sampling and Geoprobe™ seems to have descriptions of Tables 4-1 and 4-2 reversed.
 Response: Agree, the table will be corrected.
 Action: Table 6-1 will be revised so that sampling protocols reference Table 4-1 and analytes are referenced to Table 4-2.

48. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 6.0 Schedules, Deliverables, and Reporting Pg.#: 67 Table 6-1 Line#: Code: C
 Original Comment# 45
 Comment: The description of colloidal borescope should specify "four deep wells" as specified in the text.
 Response: Agree, the text will be revised accordingly.
 Action: The description of colloidal borescope will specify "four deep wells".

49. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 6.0 Pg. #: 67 Table 6-1 Line#: Code: C
 Original Comment# 46
 Comment: The description of the commitment for system operation presented in Table 6-1 was not presented in the plan and should be further described.
 Response: The commitment made in Table 6-1 is to provide Operating Reports. The contents of the reports are discussed on page 64 of the Test Plan.
 Action: No revision to the Test Plan required.
50. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 7.0 Plugging and Abandonment of the Re-Injection Wells Pg. #: 68 Code: C
 Original Comment# 47
 Comment: Will the re-injection wells be abandoned if the re-injection demonstration is unsuccessful?
 Response: Not necessarily. An evaluation of their usefulness will be conducted, perhaps as extraction wells, before any decision to plug and abandon them is made.
 Action: No revision to the Test Plan required.
51. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 8.0 Management and Responsibilities Pg. #: 69 Line#: Code: C
 Original Comment# 48
 Comment: The text "safe and prompt" should be replace with "safe, prompt, and correct"
 Response: Agree. Text will be revised as suggested.
 Action: "Safe and prompt" will be revised to "safe, prompt, and correct" on page 69.
52. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 8.0 Management and Responsibilities Pg. #: 70 Line#: Code: C
 Original Comment# 49
 Comment: The responsibility for the groundwater monitoring team to calibrate field instruments should be included.
 Response: Responsibilities listed on page 70 focus on activities which will be conducted for the demonstration. Calibration of field instruments will be done to support demonstration activities but are not a demonstration activity themselves. The calibration of field instrumentation is a job requirement prescribed in the standard operating procedures listed on page 47.
 Action: No revision to the Test Plan required.
53. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 8.0 Management and Responsibilities Pg. #: 70 Line#: Code: M
 Original Comment# 50
 Comment: Roles and responsibilities for operation of the re-injection system are not clear in Section 8.0. Information on water level data in re-injection wells in being collected by the groundwater monitoring team; however, it is not clear how this information will be relayed to the WWT operations team. It is also not clear who will be recording injection flow rates.
 Response: As stated on page 70 of the Test Plan, the Waste Water Treatment Operations Team is responsible for the operation of the re-injection system. This includes the recording of flow rates and the collection of water levels within the re-injection wells. Line 29 on page 50 states, "Operators will monitor the water levels inside each re-injection well."
 Action: Revise third bullet under GW Monitoring Team responsibilities by deleting "re-injection wells and."

54. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.0 Introduction Pg.#: 2 Line#: 2 Code: E
 Original Comment# 51
 Comment: The period following Remediation Projects should be removed.
 Response: Agree.
 Action: The period following Remediation Projects will be removed.
55. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.2 Re-injection Evaluation Strategy Pg.#: 3 Line#: 5 Code: E
 Original Comment# 52
 Comment: Change "HSI-GeoTrans" to HSI GeoTrans."
 Response: Agree.
 Action: "HSI-GeoTrans" will be changed to HSI GeoTrans.
56. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.2 Re-injection Evaluation Strategy Pg.#: 3 Line#: 11-13 Code: E
 Original Comment# 53
 Comment: Please reword sentence for greater clarity.
 Response: The sentence "Modeling re-injection as part of the remediation strategy predicted a shorter duration for the remedy by allowing additional extraction wells to be added to the remedy without increasing the net overall rate at which groundwater would be removed from the aquifer" will be revised to read as follows: "Modeling re-injection as part of the remediation strategy predicted a shorter duration for the aquifer remedy. The use of re-injection allows for additional extraction wells without increasing the net overall rate at which groundwater would be removed from the aquifer."
 Action: As noted in the above response.
57. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.3 Decision Criteria Pg.#: 5 Line#: 23 Code: E
 Original Comment# 54
 Comment: The words "in duration" should follow "shorter".
 Response: Agree.
 Action: The words "in duration" will be added to the text following "shorter".
58. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.3 Decision Criteria Pg.#: 5 Line#: 24 Code: E
 Original Comment# 55
 Comment: The words "the capture zone" should be replace with "the plume capture zone".
 Response: Agree.
 Action: The words "capture zone" will be replaced with "the plume capture zone".
59. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.3 Decision Criteria Pg.#: 5 Line#: 27 Code: E
 Original Comment# 56
 Comment: A comma should follow the word "plume."
 Response: Agree.
 Action: A comma will be added to the text following the word "plume".

60. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.3 Decision Criteria Pg.#: 5 Line#: 33-34 Code: E, and
 Section#: 1.3 Decision Criteria Pg.#: 6 Line#: 1-2 Code: E
 Original Comment# 57
 Comment: The creation of the hydraulic barrier as the southern FEMP property boundary by re-injection alone does not shorten the duration of the time to cleanup groundwater. This is accomplished by both extraction and re-injection which as the sentence describes "create hydraulic patterns and profiles within the aquifer that result in increased flushing and removal of the uranium plume." For clarity "it helps to create a hydraulic barrier at the southern FEMP property boundary, and," and "The hydraulic barrier is further explained in Section 1.4," should be removed. Additionally, "and removal" should follow "increased flushing."
 Response: Agree.
 Action: Lines 32 -34 on page 5 and lines 1-2 on page 6 will be revised to read as follows: "As described in the BRSR, groundwater modeling predicts that re-injection helps to shorten the time needed to clean up the aquifer because it helps to create hydraulic patterns and profiles within the aquifer that result in increased flushing and removal of the uranium plume."
61. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.4 Start-Up Sequence for the Demonstration Pg.#: 7 Line#: 12 Code: E
 Original Comment# 58
 Comment: The text "to determine that they have stabilized," should be replaced by "to assess and verify that they have reached stabilization."
 Response: Agree, text will be revised as suggested.
 Action: The text "to determine that they have stabilized " will be replaced by "to assess and verify that they have reached stabilization" in line 12 on page 7.
62. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.4 Start-Up Sequence for the Demonstration Pg.#: 7 Line#: 26 Code: E
 Original Comment# 59
 Comment: The text "and flow northward to create" should be replaced by "creating".
 Response: Agree, text will be changed as suggested.
 Action: The text "and flow northward to create" will be replaced by "creating" in line 26 on page 7.
63. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 1.0 Introduction Pg.#: 14 Figure 1-4 Line#: Code: E
 Original Comment# 60
 Comment: For clarity, this figure should have different line symbols for the pre-pumping and post pumping water tables. In addition, an inverted triangle should be used to designate the surface of each of the water tables.
 Response: The suggested changes will be made to the figure.
 Action: Figure 1-4 will be revised so that the pre-pumping and pumping water levels have a different line symbol. An inverted triangle will be added to designate the surface of each of the water tables.

64. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.0 Design Considerations Pg.#: 15 Line#: 25 Code: E
 Original Comment# 61
 Comment: Groundwater modeling results should be added to previous site experience.
 Response: The modeling is found in the BRSR. The BRSR is discussed in the Section 2.3 Aquifer Remedy. A sentence will be added to Section 2.3 that specifically calls out the groundwater modeling.
 Action: Lines 15 and 16 on page 19 will be revised to read as follows: "A detailed description of the planned aquifer remedy, the groundwater modeling which was conducted to design the remedy, and the proposed system that will implement the remedy can be found in the BRSR (DOE 1997a)."
65. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.1 Ohio EPA Re-Injection Guidelines Pg.#: 16 Line#: 4 Code: E
 Original Comment# 62
 Comment: The text "sampling injectate strategy" should be replaced by "injectate sampling strategy."
 Response: Text will be changed as suggested.
 Action: "Sampling injectate strategy" will be changed to "injectate sampling strategy" in line 4 on page 16.
66. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.1 Ohio EPA Re-Injection Guidelines Pg.#: 16 Line#: 11 Code: E
 Original Comment# 63
 Comment: For consistency, the comma following "wells" should be removed.
 Response: Suggested text changes will be made.
 Action: The comma following "wells" in line 11 on page 16 will be removed.
67. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.2 Aquifer Characteristics Pg.#: 17 Line#: 15 Code: E
 Original Comment# 64
 Comment: The term "anisotropic" should be replaced with "vertically and horizontally anisotropic."
 Response: The use of the term "anisotropic" as written is consistent with the definition given by Fetter in the textbook Applied Hydrogeology. Anisotropy is defined by Fetter as "The condition under which one or more of the hydraulic properties of an aquifer vary according to direction of flow." It is not necessary to designate "vertically and horizontally".
 Action: No revision to the Test Plan required.
68. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.5 Previous Site Experience Pg.#: 22 Line#: 25 Code: E
 Original Comment# 65
 Comment: For clarification between "only" and "waters" the text should state which waters should be mixed, e.g., groundwater.
 Response: The sentence is true for any two waters, groundwater, surface, etc.
 Action: No revision to the Test Plan required.
69. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
 Section#: 2.0 Design Considerations Pg.#: 29 Figure 2-4 Line#: Code: E
 Original Comment# 66
 Comment: The shading of the bedrock should be changed to avoid confusion with the shading of the remediation modules.

Response: Shading of modules is tighter and bolder than shading of the bedrock.
Action: No revision to the Test Plan required.

70. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.0 Demonstration Setup Pg.#: 31 Line#: 10 Code: E
Original Comment# 67
Comment: This sentence could read "During the demonstration, 1000 gpm of treated groundwater (injectate) from the AWWT Expansion Facility will be re-injected into the five re-injection wells at a rate of 200 gpm per well."
Response: Agree, but the sentence is also fine as it is written.
Action: No revision to the Test Plan required.

71. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.1 General Design of the Re-Injection Wells Pg.#: 32 Line#: 22-25 Code: E
Original Comment# 68
Comment: The sentence within these lines is very long. Please reword for clarity.
Response: The sentence will be divided into two sentences.
Action: Lines 22-25 on page 32 will be revised to read as follows: "It was decided though, that if the screen was so badly plugged that it needed to be replaced, then chances would be good that the porosity of the surrounding aquifer would also be reduced. It would be more cost effective in these circumstances to re-drill at a new location rather than install a new screen at the old location."

72. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 3.1 General Design of the Re-Injection Wells Pg.#: 33 Line#: 19-39 Code: E
Original Comment# 69
Comment: Because the re-injection wells have already been installed, verb tenses in this section should be in the past tense.
Response: Verb tenses will be changed as suggested.
Action: Verb tenses in lines 19 to 39 on page 33 will be changed to the past tense.

73. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.0 Testing Program Pg.#: 42 Line#: 34 Code: E
Original Comment# 70
Comment: A "to" should be inserted between "used" and "document".
Response: Agree.
Action: "To" will be inserted between "used" and "document" in line 34 on page 42.

74. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.1 Analysis of Leachate Pg.#: 43 Line#: 16 Code: E
Original Comment# 71
Comment: The text should replace "those" with "the".
Response: Suggested text change will be made.
Action: "Those" will be changed to "the" in line 16 on page 43.

75. Commenting Organization: OEPA Commentor: HSI GeoTrans, Inc.
Section#: 4.1 Analysis of Leachate Pg.#: 43 Line#: 18-19 Code: E
Original Comment# 72
Comment: MILS, limits, and levels should all be plural.
Response: Agree.
Action: In lines 18-19 on page 43, MCLs, limits and levels will all be made plural.